



Healthy Indoor Environments: Challenges for Policymakers

Workshop Report

Event held 14th July 2016

Department of Health, Skipton House, London SE1 6LH

About UK Indoor Environments Group

The UK Indoor Environments Group (UKIEG) was launched in 2003, with the aim to co-ordinate and provide a focus for UK activity concerned with improving indoor environments for people.

The UKIEG is a unique, independent and impartial multidisciplinary network of professionals working in the field of health, wellbeing and indoor environments. The UKIEG is committed to promoting the development, synthesis, dissemination and application of evidence relating to policy and practice in the UK indoor built environment, with the ultimate aim of improving health and wellbeing.

Our objectives are:

- To promote the health and wellbeing of people in indoor environments;
- To promote research and research collaboration in all aspects of the indoor environment;
- To increase awareness of current activity and knowledge gaps in areas concerned with indoor environments and people;
- To disseminate knowledge concerned with indoor environments and people;
- To help align the different conceptual, disciplinary and professional-practice approaches underpinning research, policy and professional practice concerning health and wellbeing in indoor environments in the UK;
- To promote the effective and efficient design and operation of indoor environments;
- To communicate, integrate and network activity concerned with indoor environments and people;
- To communicate and liaise with other relevant groups within the UK and abroad, and foster links with industry, Government, professional organisations, and institutions conducting relevant research;
- To promote good practice.



About Gas Safety Trust

The Gas Safety Trust, established in 2005 as a registered charitable body, has become the UK's leading gas safety research charity with the key objectives of further improving gas/fossil fuel safety for the public and industry throughout the UK and reducing the incidents of death and serious injury from carbon monoxide (CO) exposure. The Trust does this through the funding of research and data collection relating to carbon monoxide poisoning.

Gas Safety Trust provides grant funding, advice and support to any organisation to carry out research and evidence gathering relating to gas safety. Gas Safety Trust is currently funding projects that include health and wellbeing and the built environment.



About Policy Connect & The Carbon Monoxide All Fuels Forum

Policy Connect brings together parliamentarians with public and private organisations to tackle big issues across a range of sectors affected by policy. Policy Connect delivers key pieces of policy-led independent research with evidence-based recommendations to inform and improve UK public policy. By getting involved, partners can better understand their market demands and encourage Government focus on critical areas with an informed approach.

All of the above is delivered by the dedicated teams at Policy Connect who are passionately involved in policy work, and experts in their area of inquiry.

The Carbon Monoxide All Fuels Action Forum exists to bring together all organisations and stakeholders committed to tackling carbon monoxide poisoning in the UK. The Forum promotes collaboration and knowledge sharing between industry, charities, parliamentarians and policymakers, as well as coordinating awareness-raising campaign activities across the sector.



Report Authors

Report prepared by:

Isabella Myers (Independent Consultant; UKIEG: Committee Member),

Paul Harrison (IEH Consulting; Director: PTCH Consultancy Ltd.; UKIEG: Committee Member),

Derrick Crump (Indoor Air Quality Consulting Ltd.; Associate Director: IEH-Consulting Ltd.; UKIEG: Committee Member & Vice Chairman),

Marcella Ucci (Senior Lecturer: UCL; UKIEG: Chairman on behalf of the UK Indoor Environments Group Committee).

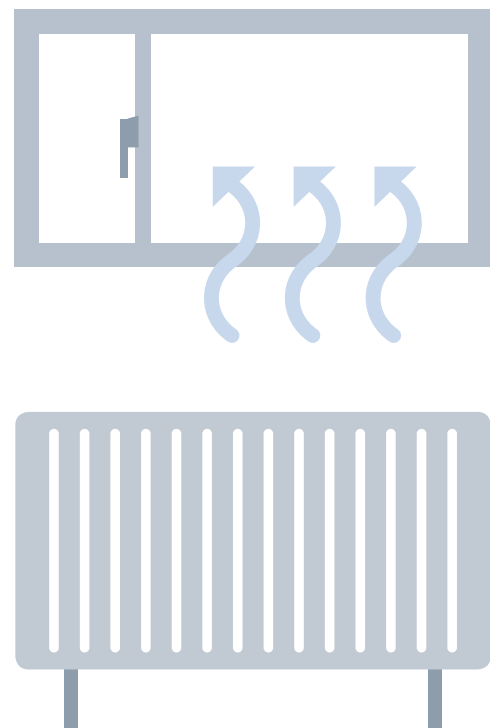
Comments from the other members of the UKIEG Committee are gratefully acknowledged.

For queries relating to this document, please contact: committee@ukieg.org

Disclaimer

The content outlined in this report does not necessarily reflect the position of individual attendees and/or of their government department or agencies.

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Abbreviations

ADF	Approved Document F
APPG	All Party Parliamentary Group
BSI	British Standards Institution
CEN	European Committee for Standardization
DCLG	Department of Communities and Local Government
CO	Carbon monoxide
CO₂	Carbon dioxide
COMEAP	Committee on the Medical Effects of Air Pollutants
COPD	Chronic Obstructive Pulmonary Disease
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DH	Department of Health
EU	European Union
GPs	General Practitioners
GST	Gas Safety Trust
IAQ	Indoor Air Quality

IEQ	Indoor Environmental Quality
ISO	International Organization for Standardization
LA	Local Authority
LSHTM	London School of Hygiene and Tropical Medicine
MVHR	Mechanical Ventilation with Heat Recovery
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
OGDs	Other Government Departments
PHE	Public Health England
REACH	Registration Evaluation Authorisation and Restriction of Chemicals
UCL	University College London
UKGBC	UK Green Buildings Council
UKIEG	UK Indoor Environments Group
VOCs	Volatile Organic Compounds
WHO	World Health Organization



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Foreword

We spend up to 90% of our lives indoors; ensuring that the indoor environment benefits our health and wellbeing is therefore important. Despite this, the damaging effects of the indoor environment are rarely fully acknowledged, nor are the necessary steps to reduce such effects being taken. This is particularly disappointing as many of the features of the indoor environment that can damage health can be corrected at comparatively low cost. Why is so little being done? In part, it is because regulating the indoor environment seems to contravene the adage ‘an Englishman’s home is his castle’.

Scientific research provides the evidence that features of the indoor environment have an adverse impact on our health and wellbeing. As an example, much of what is known about the effects of air pollutants on health comes from studies of outdoor air. Here there is no dispute: both short and long term exposure to common air pollutants damages the respiratory and cardiovascular systems and can adversely affect fetal development and, perhaps, the functioning of the brain. However, it seems to have been forgotten that people are exposed indoors to many of the same pollutants found outdoors, sometimes at levels higher than those found outdoors. It is well-known that the cost to the UK economy of exposure to outdoor air pollutants is high. However, no such estimate of the cost of indoor exposure and the potential benefits of reducing this exposure, has yet been made.

Occupant behaviour plays a large part in determining the quality of the indoor environment. How we use and maintain our buildings, the materials we use for building and furnishing, how we ventilate, how we use and maintain our heating and cooking appliances and how we store and use products that emit pollutants: all these actions can affect the quality of the indoor environment. The individual must bear some, but not all the responsibility. Government also has an important role to play, in developing higher standards for buildings, regulating products and devices used in homes, providing help for those who cannot afford to heat their homes adequately, and in advising people on how to maintain a healthy indoor environment. Likewise, other stakeholders such as those involved in the design, construction and maintenance of buildings, as well as those that develop and maintain products and devices used indoors, all share in this responsibility.

Recognising the importance of having effective policies that address the indoor environment for the protection and promotion of public health, I wholeheartedly supported a proposal to hold a workshop to review the current approach in the UK. At the workshop, held in July 2016, several important pieces of work were presented. Whilst the case was made that action by Government is needed to improve the indoor environment, it was clear that, to be effective, action could not be taken solely by any one Government Department or Agency, nor by Government Departments working independently of each other: collaborative action, across Government, would be needed. That this collaboration should be begun now and that a clear administrative lead should be identified and located in a Government Department, was a strong recommendation.

The recommendations produced by this workshop represent an important first step in addressing the development of an effective co-ordinated strategy; a strategy focussed on improving the indoor environment to support improved health and wellbeing. Government and stakeholders will need to work together to tackle the issues highlighted. But recommendations alone can accomplish little: action based on these recommendations will be needed.

I am greatly encouraged by the initiative shown by the delegates who attended this workshop. These are the people who lead the teams that protect public health, who collect vital information, who undertake research and who advise on policy: that they are so positive and enthusiastic is most impressive. I hope that the required support will be provided to allow this important work to progress in a properly co-ordinated way.

I would like to thank the delegates for participating in the workshop and for being so generous with their time and so clear and innovative in their contributions. I would also like to thank Gas Safety Trust and Policy Connect for sponsoring this event, and the UK Indoor Environments Group (UKIEG) Committee for organising and facilitating the workshop and for compiling this report.



Baroness Finlay

Professor the Baroness
Finlay of Llandaff

Executive Summary

Since people spend a large amount of time indoors, the indoor environment plays a key role in supporting occupant health and wellbeing throughout the life course. However, a multitude of indoor factors can individually or collectively have a negative effect on occupant health and wellbeing, ranging from, for example: exposures from indoor or outdoor sources of chemicals and other air pollutants, light, noise, moisture or temperature. These are influenced by many factors, including building configuration and materials, positioning of buildings within the wider urban context, and building operation. Wider aspects such as affordability, availability of space, and access to amenities can also impact on health and wellbeing.

A one-day workshop was organised and facilitated by the UKIEG to focus thought and gather opinions from UK government departments and agencies on:

- 1) what issues and priorities need addressing to protect health and wellbeing, from the perspectives of different government departments;
- 2) what opportunities and challenges this presents;
- 3) whether better coordination in this field might be required and, if so, how this could be undertaken.

Given the involvement of a number of government departments with responsibilities in this area, the potential for policies to conflict or fail through lack of consolidation, is high. But the converse is also true, with joined up working providing opportunities for real advances. The desire for action is motivated by many concerns, but in particular: that the population demographic is changing; that climate change is influencing a change in weather that will impact negatively on mortality, morbidity, building resilience and our carbon emissions; that costs to the NHS need to be reduced; that technology is changing such that our indoor and built environments need to embrace this change. Indoor pollutant monitoring and building operation opportunities have a key role in helping to improve public health. However, it also has to be borne in mind that the majority of our building stock was not constructed with these considerations in mind.

With many government departments currently having only small, isolated elements of their responsibilities associated with the indoor environment and / or health and wellbeing, the issue is not currently tackled

in a co-ordinated way at policy level. Therefore, the fragmentation of this important issue prevents it from being given the prominence and recognition at a Parliamentary level that it currently deserves.

Lessons from experiences in tackling problems with individual indoor air pollutants, and the success of such work, was highlighted in the evidence sessions. They confirmed the effectiveness of small cross government working practices, multi-stakeholder initiatives and practices undertaken in other countries. However, the need to address issues on a larger scale, whilst acknowledging the breadth of problems associated with the indoor environment and the opportunities this presented, were considered. The wider implications for health, wellbeing and the indoor built environment was discussed extensively during the two workshop sessions.

Discussion highlighted that:

- the indoor environment, health and wellbeing is truly a cross government issue;
- there are some single issues that are being taken forward by cross government working;
- there are many issues being addressed by individual government departments with stakeholder involvement;
- the evidence base needs to be presented in such a way that it can inform appropriate policy development;
- there is a need to consider what a strategy to reduce the negative effects of the indoor environment on health and wellbeing would look like and how it would be most appropriately implemented;
- the development of such a strategy will at some stage require stakeholder input;
- lessons learnt from other countries and other sectors need to be considered for implementation in the UK;
- there is a need to prioritise the issues that need to be addressed: whilst the issue of building overheating is receiving a significant amount of consideration, indoor air quality does not appear on the agenda;
- a combination of approaches are required to tackle the problem, although the majority are likely to require cross government working and local authority involvement.

It was concluded that this area needs to be given greater prominence at a Parliamentary level and to facilitate this, a more co-ordinated approach at a policy level is required. Whilst a number of issues were discussed, there was particular emphasis on how such work would be co-ordinated without a lead Government Department. A Department having ownership of the issue, acting as a facilitator of cross government working in this area, was a suggested approach. This was noted as a positive and potentially very successful modification to current methods of working for this area.

The following recommendations were made:

a) Parliamentary level

- i. A Government Department lead is needed to co-ordinate cross government department work on the issue of the indoor environment, health and wellbeing.
- ii. To establish whether a Commission on Indoor Air Quality is required to guide changes in policy development and societal behaviour relating to health and indoor air quality; to ensure effective management and enforcement of standards; and provide a mechanism for independent evidence to inform Government.
- iii. Questions should be raised for Parliamentarians:
 - a. to ask how air quality in the indoor environment affects the health and wellbeing of occupants;
 - b. to ask more questions on the indoor environment, healthy housing and the quality of the indoor environment and its effects on health and wellbeing. Questions should be raised with particular reference to the APPG Healthy Homes and Buildings, to ensure that their remit is suitably broad.
- iv. Such questions (iii a & b) should also be addressed to appropriate expert committees.
- v. A round-table event across all All Party Parliamentary Groups that have a remit covering any aspect of the indoor environment, health and wellbeing should be organised. The aim of the event could be to launch an inquiry into how best All Party Parliamentary Group activity in this area might be organised to facilitate a co-ordinated approach at policy level.
- vi. A short informative guide for Parliamentarians on indoor environmental quality should be developed (building on the POST Note produced on indoor air quality by the Parliamentary Office on Science and Technology).

b) Programmes of work to assist in policy development

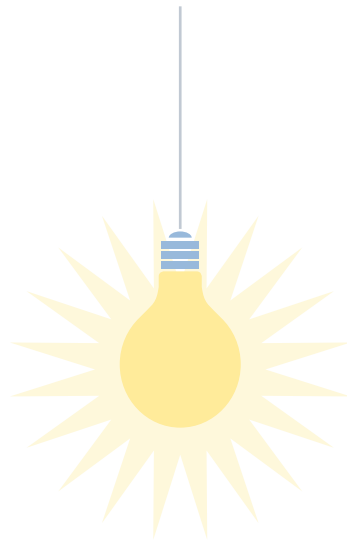
- vii. New health based standards and guidelines that have an impact on the indoor environment must be developed for the UK and existing health based standards and guidelines must be promoted, managed and enforced.
- viii. A short guide for policy makers on the indoor environment, health and wellbeing, which reports evidential information should be developed.
- ix. A programme of work should commence that focuses on raising the profile of the effects the indoor environment has on health and wellbeing.
- x. Built environment industry partners should develop housebuilding plans with Local Authorities to reduce pressures on the NHS by facilitating the practice of patients being able to be cared for in the home environment.
- xi. Building-related guidance should be developed to facilitate health protection provision for the vulnerable in relation to the health effects of climate change linked to the indoor environment.
- xii. Standards need to be developed by Local Authorities for local planners, so that disability and access requirements of the local population are satisfied in conjunction with those addressed by Part M of the Building Regulations.
- xiii. Mechanisms need to be developed and agreed between industry and relevant government / agencies for supporting and checking compliance with standards and regulations post construction.
- xiv. A follow-up workshop to continue engagement with policy makers should be held within a year to track progress of the recommendations and develop future requirements, actions and recommendations, particularly in light of changes within government.

c) Public awareness / education / stakeholder involvement

- xv. A public awareness campaign, supported by industry as appropriate, should be developed to provide information on the health risks associated with poor indoor environment quality and how to avoid them;
 - a. holistic information, advice and guidance that stimulates behaviour change in the public should be provided;
 - b. data should be collected to inform year on year campaign development.

d) Funding

- xvi. The UK Research Councils should recognise that the cross disciplinary nature of this issue does not readily fit into Research Council funding briefs. Therefore, there is a need to establish a framework and a call for research in this area that would enable Research Council funding to be sought.
- xvii. Organisations that could provide funding should develop calls for research or provide funding to relevant bodies to undertake the recommendations made above or to undertake policy orientated research that provides the evidence to underpin requirements within the recommendations.



1

Introduction

Health is affected by many features of the indoor environment. Noise, over-crowding, poor-heating or over-heating, air pollution and damp are all potentially injurious to health and continue to be so in domestic properties, schools, care homes and places of work in the UK. Whilst the work environment is regulated by the Health and Safety at Work Act, this Act was designed to protect workers from industrial hazards and does not cover, for example, the needs of children in schools or older people in private care-homes. Building Regulations, on the other hand, whilst able, to some degree, to protect occupants in their home, mainly affect new buildings. However, the majority of the UK building stock was built prior to modern regulations. Furthermore, compliance with regulations and standards post construction is not always guaranteed. Developing effective policies to deal with such issues is not easy and is in part, related to market and social conditions: for example, a large sector of the indoor environment is in private ownership: regulating conditions in homes, especially in homes affected by poverty, is difficult – especially in light of housing shortages in some UK regions.

Indoor air quality is the result of the complex interaction of weather conditions, outdoor air pollution, indoor sources of pollution, and building ventilation. The overall health balance between indoor and outdoor sources is not always an obvious one: in some cases, indoor concentrations of outdoor pollutants may be lower, but arguably exposure may be longer indoors. On the other hand, some pollutants can have both indoor and outdoor sources (resulting in greater concentrations indoors), whilst other pollutants are mainly of indoor origin – whereby ventilation may be desirable, or source control or filtration is required. A recent influential report from the Royal College of Physicians and Royal College of Paediatrics and Child Health, ‘Every Breath We Take’¹, highlights the impact that pollutants found in indoor air can have on health throughout the lifecourse.

Besides air quality, a variety of environmental factors impact upon health and wellbeing. For example, whilst extremes of temperature are known to present very serious risks to health, even small changes in temperature and CO₂ are, in some studies, being shown to negatively influence levels of productivity.

Ensuring adequate cooling and heating of buildings is important, particularly in light of changes to the climate and the need to adapt to extreme weather conditions. Noise and light can also have significant impacts on morbidity and wellbeing.

However, despite the importance of the indoor built environment on health and wellbeing, this topic does not fall under any one departmental lead, with different government departments developing policies on aspects of the built environment relevant to them to achieve their particular strategic objectives.

The need for a coordinated approach to built environment policy is becoming more prominent, as highlighted for example by the recent report of the Lords Select Committee ‘National Policy for the Built Environment’².

Taking an holistic approach to reduce the adverse impacts the indoor built environment has on health would encourage preventative policies, which would undoubtedly be welcomed by the NHS. For example, the Building Research Establishment in their report ‘The cost of poor housing to the NHS’³ estimated that in 2014, £1.4bn was spent on first injury treatment from hazards encountered in the home.

This report is a summary of a workshop aiming to discuss the challenges and opportunities for policy makers in improving health and wellbeing in the indoor environment, particularly with respect to the need for a greater focus and a co-ordinated approach; and to help identify pathways to address such challenges, both in the short and longer term.

The event reported here was styled as a workshop, with the evidence base presented in the morning via a number of short talks by established scientists in the area, and facilitated workshop discussions taking place late morning to mid-afternoon.

The event was developed and facilitated by the UKIEG, funded by Gas Safety Trust and Policy Connect. Baroness Finlay of Llandaff opened the day.

¹ <https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution>

² <http://www.parliament.uk/business/committees/committees-a-z/lords-select/built-environment/publications/> ³ <https://www.bre.co.uk/filelibrary/pdf/87741-Cost-of-Poor-Housing-Briefing-Paper-v3.pdf>

Event attendance and programme

2

The workshop was held on the 14th July in London 2016 with 15 attendees from different government departments, agencies, All Party Parliamentary Groups and sponsor organisations. There were 4 facilitators from the UKIEG Committee, two of whom gave presentations within the evidence session. The programme can be found in Appendix 1 and the attendee list in Appendix 5.

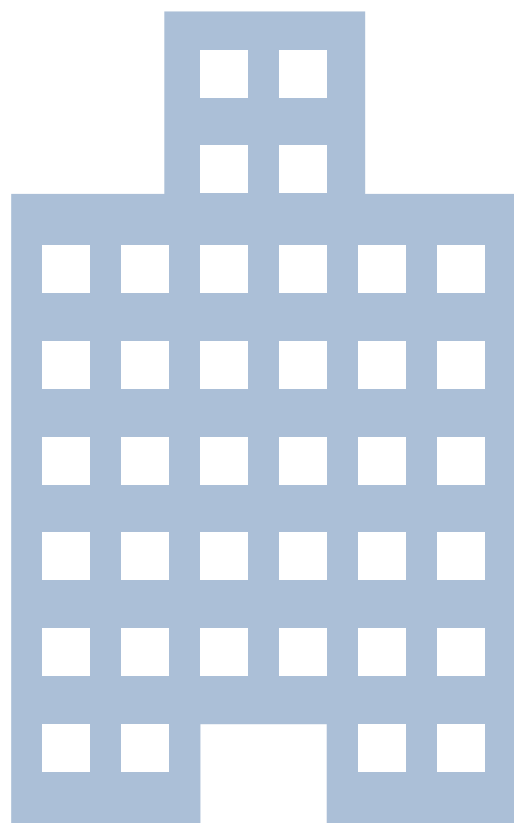
Baroness Finlay of Llandaff opened the workshop with an overview of the issues affecting health and wellbeing in the indoor environment, the requirement for a greater focus and better co-ordinated approach and the need for open discussion to facilitate decisions going forward. Tackling this issue was important, particularly as people spend over 90% of their time indoors and a poor indoor environment has an adverse impact on health at a population level.

The day consisted of an evidence session, comprised of four presentations to highlight specific areas where the indoor environment can have an impact on health and wellbeing, followed by a short discussion / question and answer session.

This was followed by Workshop I: a mapping exercise in which delegates were asked to consider a number of issues (see Appendix 2) affecting health and wellbeing in the indoor environment. Consideration was given to which Government Departments and/or Agencies might have a degree of responsibility in this area. This short exercise was followed by an open discussion on the issue regarding approaches that might assist in the co-ordination of activities and responsibilities amongst identified departments and agencies.

Workshop II required delegates to complete a worksheet consisting of four questions (see Appendix 3). Discussion of answers followed.

The day concluded with an open discussion session and the consideration of actions that should be taken forward. Delegates were also given the opportunity to provide further feedback and suggestions via a feedback form.



3 Welcome and introduction to the workshop

Baroness Finlay of Llandaff opened the workshop. The Baroness noted:

- problems pertaining to the indoor environment: example of hermetically sealed buildings; need for ventilation; appropriate lighting and daylight;
- issues relating to the pollution of indoor air by ambient air, particularly from diesel exhaust; the important relationship between town planning, high density living;
- the issue of children's health: allergy and asthma associated with exposure to ambient and indoor air pollution at school and in the home;
- that, post Brexit, public health priorities could be lowered within government which could have implications for and a damaging effect on life expectancy of the next generation.

One of the ways forward suggested in tackling the issue was identifying what Parliamentarians could do to raise the issue.

Delegates were welcomed by **Marcella Ucci**, Chairman of the UKIEG, who provided an overview of the work and objectives of UKIEG.

Isabella Myers introduced the day, reminding delegates of the diversity of the indoor environment: its many uses, styles, ages; the diversity of stakeholders, including those who might have a role in control; and that the heterogeneity of issues make the indoor environment a truly cross governmental issue.

The aims for the day were:

- to discuss the challenges and opportunities for policy makers in improving health and wellbeing in the indoor environment, particularly with respect to the need for a greater focus and a co-ordinated approach;
- to help identify pathways to address such challenges, both in the short and longer term.



Evidence session: Overview of talks

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Paul Harrison (UKIEG) gave a presentation which focussed on the indoor air aspects of the recent publication 'Every Breath We Take'⁴. He discussed:

- different sources of pollutants including: carbon monoxide, formaldehyde, house dust mites, lead dust, mineral fibres, polycyclic aromatic hydrocarbons, radon, tobacco smoke, VOCs, CO₂;
- vulnerable groups;
- specific environments such as schools;
- the issue of control – what regulations can be implemented; who to monitor; ability to control emissions;
- the issue of who is responsible;
- that around 90% of our time is spent in indoor environments, making the indoor environment, in determining occupant exposures that negatively affect health, very important.

The talk was concluded with a recommendation provided within the report which indicated that a substantial amount of robust research had been undertaken and that the findings of such research now needed to be acted upon in a coordinated manner.

Derrick Crump's (UKIEG) presentation focussed on exposure to air pollutants and the ability to significantly reduce exposure by controlling pollution sources. As an example he described the emissions from construction materials and consumer products and the measures taken in other countries to reduce their adverse impact on indoor air quality and occupant health and wellbeing.

He highlighted the ability to:

- link sources of pollutants to types of pollutants;
- remove some levels of the pollutant load through appropriate ventilation;
- identify products that emit lower levels of pollutants by choosing products that are appropriately labelled.

Derrick provided an overview of a number of labelling schemes, used mostly in Europe, that identified construction and consumer products with lower emissions of indoor air pollutants. He informed delegates of the amount of information and research that went into product testing: data provided by

chamber testing through to sensory testing. He outlined the standardised tests that require the result to be extrapolated to mimic exposure and emission patterns in large rooms.

Derrick noted that:

- UK building regulations had gone some way to address emissions from products e.g. ADF (2010) does refer to source control (although naturally, it is unable to recognise the developments made over the past decade);
- likewise: BSI, CEN, ISO and regulations including REACH and the Construction Products Directive provide a framework for effective controls;
- the EU Commission is seeking to harmonise various national systems.

In conclusion, Derrick confirmed that the control of indoor sources is protective of human health, enables lower ventilation - and is thus energy saving - and is practical with current technology.

Ann Marie Connolly (PHE) provided an overview that focussed on evidence, policy and practice with regard to the provision of healthy places, planning and housing and their impact on health. She highlighted how health was determined by 'who you are' and 'what you do' and the impact that the built environment has on health in terms of outdoor and indoor space, access to services, transport, air quality, noise, food and extreme weather, etc.

Ann Marie then highlighted a range of activities being undertaken by PHE to support the work to reduce health inequalities and improve health and wellbeing alongside improvement of the built environment and urban areas. This included:

- National Planning Policy Framework;
- National Planning Practice Guidance.

Such initiatives required PHE to work with DH, OGDs and health professionals and contained 4 key elements:

- 1) system leadership and advocacy;
- 2) building networks and partnerships;
- 3) translation of evidence base to different stakeholders;
- 4) building skills, capacity and confidence across stakeholder groups.

⁴ <https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution>

To build healthy places, Ann Marie noted 3 key areas:

- tackling obesity from an environment perspective;
- issues pertaining to cold homes and keeping warm;
- encouraging active travel.

A focus on housing itself through an explanation of PHE's housing programme highlighted another 3 areas for concern:

- 1)homelessness;
- 2)affordable housing;
- 3)public rented sector.

It was highlighted that a memorandum of understanding (MOU) to support joint action on improving health through the home had been produced. An action plan to take things forward had been prepared, but taking this further was being constrained financially and by other priorities.

It was noted that indoor air quality could be considered as part of this work.

Other evidence and guidance documents were brought to delegates' attention including:

- Planning healthier places (2 reports from the reuniting health with planning project);
- Everybody active every day (2 reports);
- Active design – planning for health and wellbeing through sport and physical activity;
- Health building note 00-08 (2 reports);
- Building the foundations: Tackling obesity through planning and development.

Ann Marie concluded her presentation by assessing what good healthy planning looked like, in particular noting:

- the need to keep up to date with technology;
- the importance of reducing non-decent housing;
- building new housing with health and quality in mind;
- promoting active transport.

Angie Bone (PHE) revealed that extreme weather events in the UK are not rare and highlighted that those having the biggest impact on health in the UK are cold weather, heatwaves and floods.

It was noted that regarding extreme temperatures, the impact of weather on individuals could be seen at levels that were not considered 'extreme'.

To reduce the impact and to protect public health from extreme weather events, PHE:

- produces guidance;
- undertakes surveillance;
- has a focus on climate change adaptation;
- has capacity building funding (based on training).

The Lancet Community Health journal had a focus on climate change in June 2015⁵ which provided the details pertaining to climate change.

Attendees were informed that the UK has a health related climate change priorities list, which was as follows:

Heat, cold, flood, air quality, health and social care, capability to respond, public understanding, of which the indoor environment spans all the above.

Heat was used as an exemplar and it was noted:

- that there are urban heat island issues in cities;
- there is concern over indoor overheating (particularly in bedrooms e.g. in homes, carehomes, hospitals).

The most vulnerable to overheating are the elderly who live in high-rise apartments in a city. However, it was noted that there are no comprehensive policies to adapt to overheating. This results in the public and professionals not understanding the risk.

The Heatwave Plan For England served as an evidence document and leaflet for the public which provided information on how to 'beat the heat'.

It was noted that BRE had produced an evidence document 'Overheating in Dwellings' which formed an assessment and guidance document primarily to help Environmental Health Professionals⁶.

DH and PHE are working on reducing the risk from overheating across the healthcare estate.

Oxford Brookes University and the Joseph Rowntree Foundation are working on overheating in carehomes. This work has identified that people working in this environment had little perception of overheating, and the effects of climate change on their working environment was not considered.

PHE research was highlighted, specifically work with UCL and LSHTM.

⁵ Watts, N, Adger, WN, Agnolucci, P et al. Health and climate change: policy responses to protect public health. Lancet. 2015; 386: 1861–1914

⁶ <https://www.bre.co.uk/filelibrary/Briefing%20papers/116885-Overheating-Guidance-v3.pdf>

Evidence session: Summary and discussion points

5

Summary

Paul Harrison provided a summary of the evidence session, drawing out in particular the common themes across the presentations. He noted:

- the complexity of the indoor environment and the problems faced by both occupants and policy makers in the control and regulation of substances in the indoor environment that can have a detrimental effect on health;
- the talks in themselves provided a long list of issues pertaining to the negative effects the indoor environment can have on health. This highlighted not only the complexity and interrelated nature of such issues being faced, but the breadth and number of issues that required consideration. What was apparent was that these deductions were based solely on the selection of issues covered in the evidence session which represented only a few examples of the issues being faced. These issues had not been prioritised or ranked above other issues that were not covered;
- issues pertaining to the indoor environment on the broadest scale, from climate change and town planning, through to the effects of internal design, temperature and individual pollutants, added to the complexity of the indoor environment on health and wellbeing and thus problems in control, regulation and policy development;
- in considering these issues, existing policies need to be taken into account, particularly those regarding sustainability;
- the importance and effectiveness of source control was very clear;
- evidence briefings and challenges had played a part in raising awareness of the issues.

Discussion

Guidelines, Guidance and Standards

There was unanimous agreement that whilst there are quantitative guidelines for a number of specific indoor air pollutants, our ability to monitor indoor air quality, particularly in the indoor domestic environment, still remained difficult. However, it was appreciated that advances in technology could significantly improve this situation.

It was suggested that emissions-based standards should be encouraged. Whilst standards were seen as useful, it was noted that in formulating standards, a health-based target of acceptable exposure is required for pollutants in appropriate settings. This gave rise to discussion on whether emission-based guidelines specific to the UK could be developed in this way, rather than being based on progressive reduction in levels, but no firm conclusion was drawn. Ensuring that standards were maintained would require monitoring. Standards and regulations would need to appreciate industry needs.

The WHO Indoor Air Quality Guidelines (for selected chemicals⁷ and for damp and mould⁸) were mentioned. It was noted that the WHO guidelines were limited in terms of pollutants covered: some countries and organisations have a greater number of pollutants with limit values attributed to them. It was questioned who in the UK would be responsible for providing such lists of pollutants, but no answer could be offered.

There was some discussion about the difference between performance-based standards, guidelines and prescriptive design standards. It was suggested that practical advice should be included within standards e.g. the use of solar shading. Attendees were reminded that developers required standards to enable them to prove categorically that their building met certain criteria / standards. This was also true for professionals associated with building design and implementation. It was agreed that for all professionals associated with the built environment, such standards were and would continue to be valuable. It was noted that currently, standards were not integrated in any way between professions and that this should be an area for further consideration.

⁷ www.euro.who.int/__data/assets/pdf_file/0009/128169/e94535.pdf

⁸ http://www.euro.who.int/__data/assets/pdf_file/0003/78636/Damp_Mould_Brochure.pdf

There were problems associated with standards in terms of the science sometimes not being advanced or robust enough to provide the information required for them to be set. This was particularly pertinent for pollutants for which a threshold of effect had still to be established. It was agreed that knowledge gaps for such pollutants needed to be addressed so that a target of acceptable exposure under appropriate scenario settings could be established. However, the success of standards was also noted, for example, the use of ventilation standards had shown that respiratory health (e.g. asthma, COPD), was significantly improved if ventilation is improved.

It was highlighted that, in the UK, the ability to enforce existing regulation was an issue: there was difficulty in ensuring compliance with standards whilst recognising the need to balance this with limits on resources and industry needs.

It was agreed that learning from initiatives undertaken in other countries should be considered and that, where possible, transfer of best practice to the UK should be made.

Joined up and co-ordinated work to help develop policy, standards and guidelines was agreed as a requirement for improving the health and wellbeing of occupants in the indoor environment. It was noted that, as an example, the UK Green Buildings Council had produced an excellent report⁹, but that it fell short in terms of the provision of specific policy-related recommendations to help improve public health. Likewise, back in the early 1990's there had been a Select Committee set up to address the indoor environment, but that whilst the recommendation to set up an interdepartmental committee had been duly followed, the Select Committee and work on the pursuing the recommendation was not maintained. Conversely, it was noted that the Cross Government Group on Gas Safety and Carbon Monoxide had run for over 11 years with significant outputs. Whilst this Group focussed on only one pollutant, by each representative department addressing the issue from their perspective, an holistic approach to the issue would ensure issues pertaining to indoor air quality; ventilation; the effect of building regulations; appliance safety; servicing and operation; and public health, are all addressed.

Housing, occupant behaviour and advice

There was some discussion regarding occupant behaviour, and the potential difficulty of disentangling the role of building design versus building operation. Mould was noted as a particular problem indoors, for example where ventilation was inadequate. The example of occupant behaviour associated with this particular issue was drying clothes indoors. The causes of different occupant behaviours were discussed: the impact of occupant choice and awareness, ability of occupants to afford a change. The ability of standards to address such issues was discussed, highlighting the desire (or lack thereof) and the cost effectiveness for landlords to prevent situations arising that relate to negative impacts on the health of occupants. Discussion continued in two parts:

- 1) issues pertaining to occupant behaviour and occupant reaction to problems that arose based on varying levels of understanding, personal tolerances and power to make a change;
- 2) problems with the housing stock in terms of structure and the cost of resolving such problems.

It was questioned how required actions, advice and information that stimulates action could be presented or provided to occupants / landlords.



Workshop I

Delegates were asked to complete a mapping exercise to demonstrate, via a list of examples, the breadth and potential synergies of policy-relevant issues pertaining to indoor environments, health and wellbeing. Delegates were asked to consider what aspects of the indoor environment, health and wellbeing were of importance to their area of work and their department, including other policy areas they were aware of that fell under their department's remit. The mapping exercise sheet also offered space for the identification of major aspects that had been omitted from the list.

Delegates were informed that this exercise was not intended to map out issues pertaining to the indoor environment in a systematic and comprehensive way, but rather to provide a useful summary overview of the most pertinent issues. Delegates were also asked to consider how the examples provided might apply to new or existing buildings in different contexts, such as housing, workplace, schools, hospitals etc.

Facilitated group discussion: summary of discussion and issues raised in Workshop I

Discussion focussed on how to ensure a healthy indoor environment both in new and existing buildings.

Indoor air quality in particular was discussed, where it was noted that there was no-one in government leading on indoor air quality and health, nor addressing knowledge gaps in this area. Whilst the Committee on the Medical Effects of Air Pollutants has a remit that covers indoor air quality, their agenda is dominated by outdoor air quality. It was noted that: Building Regulations only applied to new builds, therefore not addressing people who lived in existing housing (the majority of the housing stock); that Building Bulletin 101, which applies to schools, includes reference to indoor air quality guidelines and source control. It was agreed that the cross government approach to gas safety and carbon monoxide could be a reasonable albeit only one approach that should be applied more generally to the indoor environment and health.

Energy efficiency during and post construction was also discussed, noting again that there was comparatively little to assist the improvement of the current housing stock.

The issue of maintenance and also that of occupant behaviour; the impact that both of these had on building performance was again noted.

General discussion

Governance

Delegates considered the absence of a single government department lead, debating whether for such a fundamentally cross government issue, having one Department lead could/should be the way forward. Delegates considered whether it would be too broad an area to tackle: Government Departments are narrow in their focus. A reservation in having a one Government Department lead was raised: if there was a priority change in the lead Department, then the issue of the indoor environment and health could be lost from the agenda. It was therefore discussed whether a lead Government Department could have more of an administrative role in this area. It was noted that, for example, climate change adaptation and energy efficiency already had different Government Department leads.

Delegates acknowledged that there were examples of informal cross government groups that worked well and suggested that more of these could be established to help tackle this area. Indoor air quality was suggested as an issue that would benefit from having a dedicated cross government group. Delegates noted that there should also be a link between indoor air and outdoor air policy-making,

and that perhaps this was the most advantageous point at which to start, noting that there was a group already set up between Defra and DfT that spanned the two environments.

The concept of regulation and enforcement was also discussed. However, a mechanism to enforce such regulation and the problem with monitoring the maintenance of standards was noted.

Stakeholder engagement: All Party Parliamentary Groups; Industry

Delegates noted that there were a number of All Party Parliamentary Groups engaged in this area and that these Groups had a role in pushing issues on the indoor environment, health and wellbeing to Government Department via Parliamentarians.

It was queried whether having a single Departmental lead would be beneficial for stakeholders?

Delegates were keen for industry to be engaged in the future considerations. The UKGBC report on healthy homes¹⁰ provided a business case for newbuilds. This type of work was considered highly influential.

Research

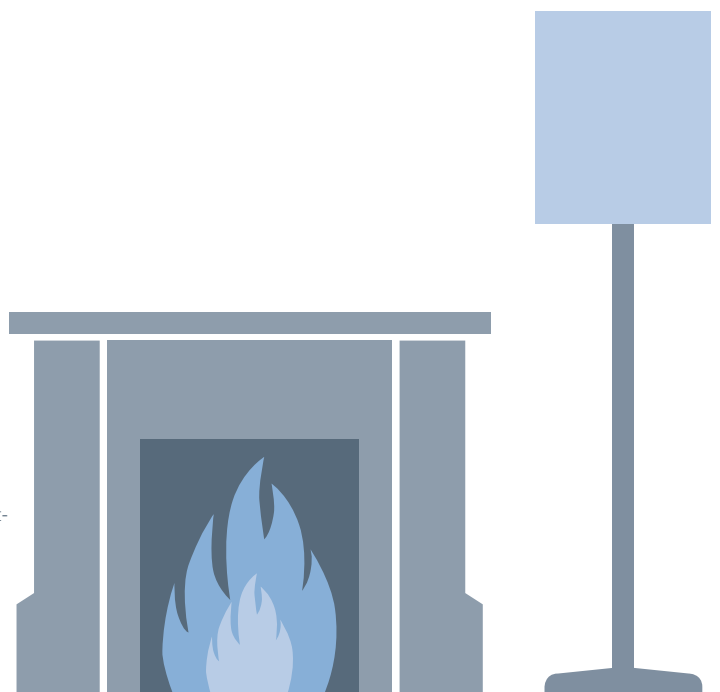
Delegates were aware of the vast amount of scientific work undertaken by academic departments worldwide. However, it was noted that the impact of such work had not stimulated much action at a policy level. It was suggested that this might, in part, be due to the funding of such work not being undertaken by the UK Research Councils - or that, whilst results were robust, the studies that had been undertaken were small, therefore not attracting UK Research Council funding.

It was suggested that research outcomes needed to be presented in a way that stimulate policy development. One way of doing this was to link current high priority policy research areas with research in the indoor environment. Another suggestion was to stress the link between the indoor environment and productivity. Quantifying the issue and linking this to health data would provide a particularly powerful message and one which would be acknowledged by Government.

Priority areas

Current priority areas of concern, particularly at a policy level, regarding the effect of the indoor environment on health and wellbeing, were not known. Examples of priority areas raised regarding the indoor environment for the workplace were cancer and stress.

Delegates questioned the weighting given to other aspects, not so far discussed, that affect health in the indoor environment, such as environmental noise and lighting. It was noted that DCLG, Defra and DH all have, or used to have, an element of responsibility for these issues. No firm conclusion was provided due to the absence of policy leads in these areas.



¹⁰ <http://www.ukgbc.org/resources/publication/uk-gbc-task-group-report-healthy-homes>

Workshop II

Delegates were provided with a worksheet containing 4 questions that were used to facilitate discussion. The questions were as follows:

Question 1: What are the key drivers / influences / modifiable risk factors that affect health and wellbeing in the indoor environment?

Question 2: What opportunities or challenges do these drivers / influences/ modifiable risk factors present in improving health and wellbeing in the indoor environment? Might there be synergies and further opportunities to be realised?

Question 3: Is there a need for a strategy to link or co-ordinate policy in this area?

Question 4: What is required to start / promote / support any process identified, going forward?

Facilitated group discussion: summary of discussion and issues raised in Workshop II

Question 1: What are the key drivers / influences / modifiable risk factors that affect health and wellbeing in the indoor environment?

Population Health

An ageing population was considered an increasingly significant factor in relation to population health and the indoor environment, especially when coupled with the projected effects of climate change. An ageing population contributes to important social and political issues - in particular, impacts on the NHS and health policies aimed at keeping people out of hospital. Taking this to a local level, it was noted that planners need to be able to access a set of standards based on Local Authority needs, to incorporate, for example, local disability and access requirements.

The issue of cold homes was considered a significant health problem, with strong epidemiological evidence underpinning this relationship. Cost benefit analysis of this relationship also provided a strong case for improvement, particularly amongst GPs and allied health professionals working with GPs. Further work, including NICE guidance regarding the prevention of cold weather associated mortality, would help with tackling this serious health issue, particularly in the development of mechanisms for referral.

Exposure to sensitizers in the workplace and knock-on effects for respiratory health, including

the exacerbation of existing illness, was considered significant with associated numbers of deaths currently around 13,000 per year.

The Occupier

Evidence from work relating to the risk of CO poisoning in occupants living in private rented sector accommodation, showed that the greatest risk was in those with a low income, irrespective of the age of the property. It was noted that a lack of choice often prevented people from making complaints.

The Building and Market Drivers

The drive towards minimum cost in new builds (e.g. schools) was noted and this gave rise to the need for an indisputable minimum standard. The housing shortage also indirectly contributes to the issue of poor indoor environmental quality, since there is limited market-driven incentive for raising quality, both in new builds and in the private rented sector.

All delegates agreed that there was a need for post occupancy evaluation of buildings, not only for assessment of performance but also to feed into economic evaluation, cost benefit analysis and other monitoring and evaluation requirements.

Question 2: What opportunities or challenges do these drivers/influences/ modifiable risk factors present in improving health and wellbeing in the indoor environment? Might there be synergies and further opportunities to be realised?

Opportunities

In considering the example of cold homes and the potential for GPs initiating an intervention with allied health professionals, the question of legislation and the provision of powers was highlighted. It was noted that social prescribing had used the GP database to identify those at risk and requiring housing help. Use of the Healthy Housing Safety Rating System had been used by PHE to enable data to be analysed.

DEWIS Cymru ¹¹ was noted as an approach that enabled the improvement of health and wellbeing of people in their homes.



Challenges

The discussion of cold homes highlighted challenges in identifying the reasons for occupants being in cold homes: people who live in leaky homes; people who are unable to work the controls with sufficient ease; people who are thrifty; and people who are fuel poor in that they have to choose between eating and heating their home. Each of these scenarios required identification and the implementation of different methods and mechanisms to address the problem.

Another challenge that was highlighted was the issue of using MVHR. It was noted that the issues were similar to those faced by the gas industry in protecting against CO, such as maintenance and servicing, appropriate use and awareness of dangers. Such problems are already faced by the gas, solid fuel and oil industry in association with domestic appliances. The concerns associated with MVHR, coupled with the absence of a body to regulate the servicing, maintenance and operation of these appliances - or a Government Department that such a body would report to - was considered a serious gap.

Question 3: Is there a need for a strategy to link or co-ordinate policy in this area?

Delegates agreed that the absence of a Government Department that could lead on or administrate this subject area presented a serious gap. Delegates were keen to capitalise and build on the experience and success of the Cross Government Group on Gas Safety and CO, the All Party Parliamentary CO Group and its sub- groups. It was noted that such a hierarchical approach was needed. Delegates suggested that a way forward would be to engage

with the existing All Party Parliamentary Groups that have an interest in this area and see if an All Party Parliamentary Group on indoor environment, health and wellbeing would be advantageous. It was noted that such a Group would link closely with the All Party Parliamentary Group on Fuel Poverty to enable that element of the issue of cold homes to be addressed without overlap.

Question 4: What is required to start/promote/support any process identified, going forward?

Engaging Ministers and identifying someone who would champion the cause was noted as essential for the success of work in this area. Setting up a Committee or engaging with, for example, the Environmental Audit Committee would be important. It was also considered

important to make a link with ambient air quality issues. Producing a statement of evidence was considered a good starting point to engage different audiences. It was noted that there was apparently little pressure from the public on this issue.

Concluding remarks & considerations from the delegates

Governance

From the outset, it was noted that Theresa May, in her inaugural speech, had stated that housing must be a priority; those with a remit in the indoor environment need to work towards this priority.

One way Parliamentarians could raise the issue of the indoor environment, health and wellbeing would be to raise questions requiring written answers by Ministers.

How we liaise with different APPGs, and which strategies to use to get the message across to (and engage) interested Ministers is important, particularly if the issue of the indoor environment and its impact on health and wellbeing is to be kept on the Ministerial agenda. Presenting questions to Ministers would assist in this.

The synergies between APPGs currently working in this field need to be mapped out. An improved understanding of the remit of the new APPG on Healthy Homes and Buildings is required before suggestions regarding its remit or an APPG on the Indoor Environment can be considered.

At a Cross Government level, mapping out who is responsible for each aspect of the indoor environment, health and wellbeing, to a level of detail that allows the responsibility for the component parts of pollution issues to be identified, was considered important. It is important to clarify the complexity of the issue.

If a Clean Air Commission is established, this could raise the profile of indoor air quality if it were to be incorporated within the broader remit of the Commission. However, if this were not the case, then the creation of a separate Commission on Indoor Air should be considered.

Stakeholders

It is important to create an understanding of what is meant by 'indoor air quality' as this could have a range of different meanings for different stakeholders.

There is public interest in building design and health, but there appears to be a lack of awareness regarding indoor air quality in the domestic environment. It was agreed that charities and pressure groups with a focus on this area should be identified.

Data collection on the indoor environment should improve with the development of new technologies, but it was considered important to identify stakeholders within this area.

Guidelines / Guidance / Regulations

It was noted that only a small proportion of the population lived in newly built properties and therefore the majority of problems pertaining to the indoor environment, health and wellbeing related to older properties. Regulation for construction of the built environment would only affect a tiny proportion of the existing building stock. However, where regulations were used, it was important that the occupier also understood their responsibility in upholding that regulation.

It was agreed that an integrated approach at the building level and planning level would be required to improve the indoor environment.

Information provided to stakeholders and the public needs to be relevant at a local level.

Whilst the impact of leaving the European Union is uncertain, it is important that experiences from other countries' regulations and guidance, and the requirements demanded of the construction and consumer product industries, are evaluated for relevance and application in the UK.

The results of commissioned research should be noted. Delegates agreed that research is key to underpinning action in this area, and new information that can drive development should be used effectively. IAQ in new homes needed to be monitored. It was noted that the Building Regulations, in 2010, revised the provision of air quality for airtight homes and research had been commissioned by DCLG to monitor the effect of this revision. Publication of this research was expected in the near future.



8

Recommendations

From the evidence presented, outcomes of workshop activities and comments made throughout the day, the following recommendations have been made:

a) Parliamentary level

- i. A Government Department lead is needed to co-ordinate cross government department work on the issue of the indoor environment, health and wellbeing.
- ii. To establish whether a Commission on Indoor Air Quality is required to guide changes in policy development and societal behaviour relating to health and indoor air quality; to ensure effective management and enforcement of standards; and provide a mechanism for independent evidence to inform Government.
- iii. Questions should be raised for Parliamentarians:
 - a. to ask how air quality in the indoor environment affects the health and wellbeing of occupants;
 - b. to ask more questions on the indoor environment, healthy housing and the quality of the indoor environment and its effects on health and wellbeing. Questions should be raised with particular reference to the APPG Healthy Homes and Buildings, to ensure that their remit is suitably broad;
- iv. Such questions (iii a & b) should also be addressed to appropriate expert committees.
- v. A round-table event across all All Party Parliamentary Groups that have a remit covering any aspect of the indoor environment, health and wellbeing should be organised. The aim of the event could be to launch an inquiry into how best All Party Parliamentary Group activity in this area might be organised to facilitate a co-ordinated approach at policy level.
- vi. A short informative guide for Parliamentarians on indoor environmental quality should be developed (building on the POST Note produced on indoor air quality by the Parliamentary Office on Science and Technology).

b) Programmes of work to assist in policy development

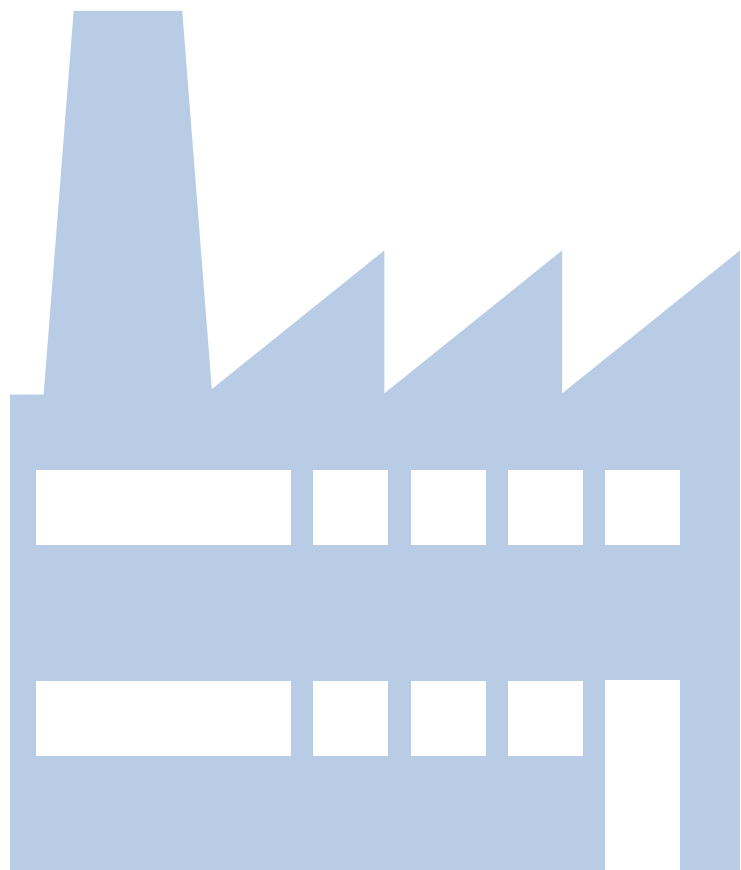
- vii. New health based standards and guidelines that have an impact on the indoor environment must be developed for the UK and existing health based standards and guidelines must be promoted, managed and enforced.
- viii. A short guide for policy makers on the indoor environment, health and wellbeing, which reports evidential information should be developed.
- ix. A programme of work should commence that focuses on raising the profile of the effects the indoor environment has on health and wellbeing.
- x. Built environment industry partners should develop housebuilding plans with Local Authorities to reduce pressures on the NHS by facilitating the practice of patients being able to be cared for in the home environment.
- xi. Building-related guidance should be developed to facilitate health protection provision for the vulnerable in relation to the health effects of climate change linked to the indoor environment.
- xii. Standards need to be developed by Local Authorities for local planners, so that disability and access requirements of the local population are satisfied.
- xiii. Mechanisms need to be developed and agreed between industry and relevant government / agencies for supporting and checking compliance with standards and regulations post construction.
- xiv. A follow-up workshop to continue engagement with policy makers should be held within a year to track progress of the recommendations and develop future requirements, actions and recommendations, particularly in light of changes within government.

c) Public awareness / education / stakeholder involvement

- xv. A public awareness campaign, supported by industry as appropriate, should be developed to provide information on the health risks associated with poor indoor environment quality and how to avoid them;
 - a. holistic information, advice and guidance that stimulates behaviour change in the public should be provided;
 - b. data should be collected to inform year on year campaign development.

d) Funding

- xvi. The UK Research Councils should recognise that the cross disciplinary nature of this issue does not readily fit into Research Council funding briefs. Therefore, there is a need to establish a framework and a call for research in this area that would enable Research Council funding to be sought.
- xvii. Organisations that could provide funding should develop calls for research or provide funding to relevant bodies to undertake the recommendations made above or to undertake policy orientated research that provides the evidence to underpin requirements within the recommendations.



Appendix 1: Programme

AGENDA

HEALTHY INDOOR ENVIRONMENTS: CHALLENGES FOR POLICY MAKERS

10.00 – 15.30, Thursday 14TH July 2016

Department of Health, Skipton House, London Road, London SE1 6LH

Time		Speaker
Morning		
10.00 – 10.15	Coffee	
10.15 – 10.20	Welcome	Baroness Finlay of Llandaff
10.20 – 10.25	UKIEG	Marcella Ucci UKIEG Chairman
10.25 – 10.35	Introduction to workshop	Isabella Myers UKIEG
Evidence Session		
10.30 – 10.45	Evidence – Every Breathe We Take: ¹² : The Importance Of Indoor Air Pollution	Paul Harrison UKIEG
10.45 – 10.55	Evidence – Source Control	Derrick Crump UKIEG
10.55 – 11.05	Evidence – The Built Environment, Planning And Health	Ann Marie Connolly PHE
11.05 – 11.15	Evidence – Reducing Vulnerability To Climate Change And Extreme Events	Angie Bone PHE
11.15 – 11.25	Gas Safety Trust	Mary Benwell GST
11.25 – 11.40	Summary / Q&A	Paul Harrison UKIEG
Workshop Session I		
11.40 – 12.50	Workshop – Plenary	Paul Harrison / Marcella Ucci
Afternoon		
12.50 – 13.30	Lunch	
Workshop Session II		
13.30 – 14.45	Workshop – Group Discussion	Derrick Crump / Marcella Ucci
14.45 – 15.15	Discussion & Next Steps	ALL
15.15 - 15.30	Summary and Close	Marcella Ucci

Appendix 2: Workshop I list

HEALTHY INDOOR ENVIRONMENTS: CHALLENGES FOR POLICY MAKERS

10.00 – 15.30, Thursday 14TH July 2016

Department of Health, Skipton House, London Road, London SE1 6LH

Examples of Possible Indoor Air and Environmental Quality (IEQ), Policy Related Issues

Protecting public health through managing IAQ – who is responsible / leads / co-ordinates/ provides expert advice; are responsibilities mapped out, could process be improved?

High level policy	Notes (e.g. Government stakeholder, such as DCLG, DfE, DECC)
1 Energy efficiency – ventilation – IAQ (role of Building Regs & EPBD), refurbishment	
2 Source control – labelling products – construction and consumer product emissions; UK & international actions	
3 Natural vs mechanical ventilation: design, build quality, usability, maintenance and impact on IAQ	
4 Contaminated land – protection against ingress of vapours and gases.	
5 Climate change – impact on IAQ for new and existing buildings	
6 Linking IAQ to the sustainability agenda; e.g. green buildings, green chemistry, whole life cycle, circular economy, sustainable products	
7 Performance and well-being; impacts on productivity and learning; offices, schools, homeworking	
8 Health impacts and costs to the NHS	
9 Application of IAQ guidelines / standards in non-industrial environments	
10 Temperatures indoor (too cold, too hot).	
11 Temperatures indoor: links with Climate change, fuel poverty and energy efficiency agendas	
Guidance and information	
12 Radon – engaging the public and effective action	
13 Public information on IAQ; provision of advice including CO risk awareness	
14 Information gathering on IAQ issues; collation of evidence, reporting of IAQ problems	
15 Guidance on air cleaning technologies and biosystems (plants) for maintaining IAQ	
16 Provision of expert advice to government on IAQ	

Measuring impact		Notes (e.g. Government stakeholder, such as DCLG, DfE, DECC)
17	Combustion gases; identifying CO incidents and impact of low level exposure	
18	IAQ and health impact – exposure to outdoor and indoor generated pollutants, role of indoor environment in exposure, knowledge and gaps	
19	Indoor generated PM v outdoor generated PM toxicity	
20	Dampness and mould – links to ill health, dealing with the problem	
21	Biomass burning in homes – consequences for indoor and outdoor air	
22	Control of allergens – biological and chemical, role in asthma etc.	
Sector policy issues		
23	Schools (and pre-schools): ventilation provision, outdoor AQ impact, CO2 as an indicator	
24	IAQ in hospitals; wards to operating theatres	
25	IAQ and medical care at home; implications and advice for COPD cases, cardiac patients.	
Related issues		
26	Building as protection from major air pollution incidents; advice on when to seek other shelter.	
27	Resilience; chemical and biological incidence; role of buildings	
28	Regulation / maintenance of construction vehicle / machinery operation / use	
29	Cars, trains and planes – exposure in enclosed transport environments	
30	Exposure to hazardous substances via indoor dust; risks to young children	
31	Second hand smoking – at home and in vehicles	
Specific management tools		
32	Incentives for provision of good IAQ (penalties for poor IAQ?); building owners, landlords	
33	Workplace exposures, including the consideration of the effects of additional exposures from non-occupational settings	
34	Regulation / maintenance of appliances (domestic)	
35	Management of fibres (asbestos in particular) in buildings	
36	Impact of REACH regulations on population exposure in indoor environments	
37	Good practice guidance for designers and managers of buildings	

Notes (e.g. Government stakeholder, such as DCLG, DfE, DECC)

Improving knowledge to inform policy

38	IAQ investigation and research; commissioning and funding research (research councils, charities, government departments, EU)	
39	Knowledge gaps; measurement methods, exposure, toxicity, epidemiology, case studies	

Other IAQ Policy issues not listed above

Examples of other Indoor Environment related issues re Health and Wellbeing

40	Ambient air quality	
41	Noise	
42	Lighting	
43	Ergonomics	
44	Safe design; stairs etc.	
45	Space	
46	Occupancy and overcrowding	
47	Fuel poverty	
48	Access to outdoor open space; impact on health including mental wellbeing	

Appendix 3: Workshop II questionnaire

HEALTHY INDOOR ENVIRONMENTS: CHALLENGES FOR POLICY MAKERS

10.00 – 15.30, Thursday 14TH July 2016

Department of Health, Skipton House, London Road, London SE1 6LH

Name: _____

Affiliation: _____

Workshop 2 – Group Discussion

From your and your organisation's perspective, what are your opinions on the following:

QUESTION 1:

What are the key drivers / influences / modifiable risk factors that affect health and wellbeing in the indoor environment?

QUESTION 2:

What opportunities or challenges do these drivers / influences / modifiable risk factor present in improving health and wellbeing in the indoor environment? Might there be synergies and further opportunities to be realised?

QUESTION 3:

Is there a need for a strategy to link or co-ordinate policy in this area?

QUESTION 4:

What is required to start / promote / support any process identified, going forward?

Appendix 4: Evaluation of event

A summary of the collective responses from returned evaluation forms (total 9)

HEALTHY INDOOR ENVIRONMENTS: CHALLENGES FOR POLICY MAKERS

10.00 – 15.30, Thursday 14TH July 2016

Department of Health, Skipton House, London Road, London SE1 6LH

Feedback and Suggestions Form

Name: _____

Organisation: _____

Job Title: _____

Email Address: _____

Thank you for attending the workshop. We would greatly appreciate if you would take a few minutes to complete this form. Using the scale below (1-5), please rate:

1	2	3	4	5
Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

	Your rating (1-5)
The workshop was useful and informative	Average 1.7
The workshop highlighted issues which are relevant to my work area	Average 1.5
The workshop enabled me to network with known and new colleagues whom I did not realise worked in an area that overlapped with mine	Average 2.1

As a result of this workshop, I am considering undertaking the following actions

(provide details below, if possible)

- Reach out to FPEEG (run by NEA) to highlight links between CO risk and low income houses and scope the extent to which we could work together in the future
- Facilitating the tabling of relevant parliamentary written questions
- Facilitating the meeting of like-minded APPGs
- Feedback to manager to see if HSE can usefully be involved in any future activity. Interested in progress on topic. HSE interested in IAQ in workplace and respiratory disease. Will continue to gather evidence to inform policy.
- Ensure link between IAQ and ambient AQ is maintained
- No immediate plans but monitoring IEQ developments
- Feeding back to colleagues in PHW. V interesting and informative day thank you
- Review research highlighted at presentations where relevant to policy area
- Talk to colleagues from other depts about specific issues agreed
- Encourage DCLG participation in any Xgovt working group activities
- Continue to explore / improve role for regulation mindful I can only reach limited activities

Do you have any suggestions about how we might best follow up the issues which were raised at the workshop? Please provide details below

- Contact relevant APPG and cross government groups x2
- Identify relevant, engaged MPs and other parliamentarians
- Ask Government which department leads on IAQ
- Report back on findings
- Produce a who does what on specific IAQ topics
- None other than raised / discussed in workshop. However, an update in 6 months / yr would be beneficial.

If you have any further comments about the event or the issues raised at the event, please include them here:

- Good workshop
 - Very good, well done
 - Good event
-

Thank you for taking the time to complete this questionnaire

Appendix 5: Attendee list

HEALTHY INDOOR ENVIRONMENTS: CHALLENGES FOR POLICY MAKERS

10.00 – 15.30, Thursday 14TH July 2016

Department of Health, Skipton House, London Road, London SE1 6LH

Name	Govt dept. / responsibility
Clyde Ashby	Buildings Scotland
Angie Bone*	PHE Extreme Events and Climate Change
[Steve Brown	OFGEM]
[Fionnuala Byrne	Defra Local Air Quality]
Ann Marie Connolly*	PHE Housing
Derrick Crump*	UKIEG
Richard Daniels	EFA School Buildings
Paul Decort	DCLG Building Regulations Part J Combustion Appliances
Richard Denham	Policy Connect – APPCOG
Sani Dimitroulopoulou	PHE Air Pollution & Climate Change
Baroness Finlay*	All Party Parliamentary Carbon Monoxide Group
Jonathan Graves	DH Air Quality
Paul Harrison*	UKIEG
[Abbie Johnson	DCLG Alarms and Rented Sector]
Graham Jukes	CIEH
[James Kerry	DECC Home Energy]
[Adrian McConnell	GST]
[Alex Murphy	DCLG Construction Products Directive]
Isabella Myers*	UKIEG
Tom Pashby	Policy Connect – All Fuels Forum
[Carl Petrokofsky	PHE Housing]
Peter Rankin	DCLG Building Regulations Part F Ventilation
Diane Tsavalos	HSE – Health and Chemicals Unit
Marcella Ucci*	UKIEG
Sotiris Vardoulakis	PHE Air Pollution & Climate Change
[Jane Vaus	All Party Parliamentary Group Air Pollution]
Louise Woodfine	Public Health Wales

*Speaker; [Name]: unable to attend on the day

Appendix 6: Speaker biographies

HEALTHY INDOOR ENVIRONMENTS: CHALLENGES FOR POLICY MAKERS

10.00 – 15.30, Thursday 14TH July 2016

Department of Health, Skipton House, London Road, London SE1 6LH



Professor The Baroness Finlay of Llandaff

FRCP, FRCGP, FMedSci, FHEA, FLSW

Baroness Finlay is a Welsh doctor, professor of palliative medicine, and an Independent Crossbench member of the House of Lords. Baroness Finlay is President of the Chartered Society of Physiotherapy, and Past President of the Royal Society of Medicine and the British Medical Association.

She co-chairs the All-Party Parliamentary Carbon Monoxide Group, which brings together parliamentarians committed to tackling carbon monoxide poisoning. In October 2011, following a six-month inquiry which she chaired, the Group produced a report entitled *Preventing Carbon Monoxide Poisoning*, including a number of recommendations for policy and behaviour change. She sits on the Built Environment Committee.

As a Crossbench Peer in the House of Lords (since 2001), she has served on key committees including: Science and Technology, Assisted Dying for the Terminally Ill, and Public Services and Demographic Change. She introduced the Smoking in Public Places (Wales) Bill, took the Sunbeds Act through the Lords and led the re-institution of the post of the Chief Coroner.

Lady Finlay has also recently influenced the ban on smoking in cars with children present, standardised tobacco packaging, and compassionate leave for those caring for bereaved children when in receipt of universal credit.



Dr Marcella Ucci

Lecturer: UCL; Chairman: UKIEG

Dr Marcella Ucci is a Lecturer in Environmental and Healthy Buildings at the UCL Institute for Environmental Design and Engineering, at The Bartlett Faculty of the Built Environment, UCL. She graduated in architecture from the University of Naples (Italy), and then obtained an MSc in 'Environmental Design and Engineering' and a PhD in indoor air quality and modeling - both from the Bartlett School of Graduate Studies, UCL.

Her research focuses on the interactions and tensions between sustainable building design/operation and the needs of occupants in terms of comfort, health and wellbeing. Her expertise includes building monitoring and modelling, health impact of buildings (especially biological such as dust mites), application of epidemiological methods to built environment studies, and operational aspect of buildings - especially occupant behaviour.

Dr Ucci is Chair of the UK Indoor Environments Group (UKIEG) - a multidisciplinary network of academics, policy-makers and industry - set up to co-ordinate and provide a focus for UK activity concerned with indoor environments, health and well-being. She is also a Committee member of the Sustainability Special Interest Group at the British Institute of Facilities Management (BIFM). Dr Ucci is Deputy Editor of *Indoor and Built Environment*, and Associate Editor of *Architectural Science Review*. She is also member of the Executive Committee of the UCL Centre for Behaviour Change.



Professor Paul Harrison

BSc, PhD, Grad Cert Ed (Coll), CBiol, FRSB, FBTS

Paul has worked as an independent consultant since 2008 and is a Director of IEH Consulting and Owner/Director of PTCH Consultancy Limited. He is a Fellow of the Royal Society of Biology and the British Toxicology Society, and was Visiting Professor in Environment and Health at Cranfield University.

Paul's previous positions have included Senior Toxicologist at BP's Occupational Health Centre where he was responsible for advising on the toxicity of various chemicals and products and for the unit's research quality assurance programme. He joined the UK Department of the Environment in 1991 and became Head of the Indoor Air Quality and

Major Accidents Branch of the Toxic Substances Division before being seconded to the Medical Research Council in October 1993 to help establish the Institute for Environment and Health (MRC-IEH) at Leicester University. He was appointed Acting Director of MRC-IEH in July 1998, and became Director of the Institute when it moved to Cranfield University in November 2005.

Paul has held positions on various expert groups and committees including the UK Chemicals Stakeholder Forum (Deputy Chair), EC Expert Group on Indoor Air Quality, DH Committee on the Medical Effects of Air Pollutants, the Expert Panel on Air Quality Standards, the Advisory Committee on Hazardous Substances, the Food Standard's Agency Working Party on Chemical Contaminants in Food, and the Interdepartmental Group on Health Risks from Chemicals. He was also the founder Chairman of the UK Indoor Environments Group. He has published many scientific papers and articles on a broad range of environment and health issues, notably indoor air quality, endocrine disruption and fibre toxicology, and is on the editorial board of several distinguished journals. He is also past Chairman of the Cranfield University Health Research Ethics Committee.



Dr Derrick Crump

BSc, PhD, FRSPH, MIES, MIAQM

Director: Indoor Air Quality Consulting Ltd.; Associate Director: IEH-Consulting Ltd.; UKIEG: Committee Member & Vice Chairman

Derrick is an environmental and health scientist with an international reputation for his expertise in the measurement and assessment of indoor air quality. For approaching 40 years he has been engaged in scientific consultancy, research, teaching and government policy work. In that time he has lead scientific teams within the (then) UK Department of Environment (Toxic Substances Division), BRE (and the former Building Research Establishment) and was Director of the Institute of Environment and Health (IEH) at Cranfield University (2009-2015).

Since the early 1980s the main focus of his work has concerned indoor environments. Major projects include the IAQ survey of England, contaminated land at Weston Village, development of methods for VOC emission testing, air quality in new homes in England, and contaminants in aircraft cabin air. During one of his periods in DoE he was secretary of the then Interdepartmental Committee on IAQ and was involved with the production of several public information booklets on aspects of indoor pollution and public health.

He currently serves on national (BSI) and international standardisation (CEN and ISO) committees concerned with developing methods to measure indoor pollutants and the evaluation of 'dangerous substances' used in materials, as well as European expert groups concerned with air quality and assessment of exposure to pollution. His research and consultancy work has been reported in 175 peer reviewed journal, book and conference papers as well as numerous client reports. Currently he works independently with a number of organisations as an expert advisor as well as in association with colleagues at IEH Consulting and as a Visiting Research Fellow at Cranfield University.



Mrs Isabella Myers

BSc DIC MSc MRSB
Independent Consultant on Health, Policy And The Environment; UKIEG: Committee Member

Isabella Myers is an independent consultant with over 20 years' experience on the health effects associated with environmental hazards in the indoor and outdoor environment.

Between 2001 – 2015, Isabella was a member of the Public Health England (PHE) Toxicology Unit at Imperial College, London, where she supported the Air Pollution and Climate Change Group within PHE (previously the Department of Health's Air Pollution, Climate Change and Noise Unit). She was responsible for: the development, implementation and support of health-based policies for government departments; leading the scientific work on indoor air pollution, creating and implementing the strategic approach to the protection of public health from the effects of carbon monoxide poisoning. She provided scientific Secretariat support to the Government's Expert Committee on the Medical Effects of Air Pollutants (COMEAP); and provided advice via this role and membership of government advisory groups to other government departments, UK Ministers and stakeholders on air pollution, climate change, extreme events and noise pollution. Isabella has also been a contributing author to reports, peer reviewed papers and book chapters in her field of expertise.

A scientist by training, Isabella gained her Diploma and Masters degree in Environmental Technology, specialising in Health, from Imperial College, London. She is a Member of the All Party Parliamentary Group's All Fuels Action Forum Advisory Board and Forum, Chairman of its Medical and Healthcare Professionals' Sub-Group; Committee Member and past Secretary of the UK Indoor Environments Group, and a member of both the Royal Society of Biology and the British Toxicology Society.



Dr Angie Bone

Head of Extreme Events and Health Protection,
Public Health England

Angie is a consultant in public health and part of the Extreme Events and Health Protection team at Public Health England. A medical doctor by background, she has a broad range of experience at local, national and international level. This includes UK public health training, European Programme in Interventional Epidemiology training (EPIET), and appointments with the Health Protection Agency, Merlin and the International Committee of the Red Cross, and the World Health Organization.

Angie's interests include environmental public health and infectious disease epidemiology. Her main area of interest is on reducing vulnerability to extreme events and climate change, through sustainable development, and appropriate preparedness, response and recovery. She is particularly focussed on public health actions that both protect health from extreme events, as well as improving health and well-being, such as addressing fuel poverty, promoting active transport and green infrastructure. She is keen to ensure that what we do know to be effective is translated into practice, and in ensuring that public health initiatives are evaluated in order to improve and share knowledge.



Dr Ann Marie Connolly

Deputy Director of Health Equity and Mental Health, Public Health England

Dr Ann Marie Connolly was appointed to Public Health England in April 2013. Working from the Health and Wellbeing Directorate her role is to ensure that the new public health system is supported to address health inequalities and the determinants of those inequalities, including promoting healthy places. Her role includes leading the Healthy Places team for PHE with a focus on the health and the built and natural environment.

Originally trained as a GP, Dr Connolly has been working in public health for the past 25 years, at local as well as national and international level. Over her career she has held a variety of posts both within and outside of the UK. These include working for WHO EURO on Healthy Cities across Europe, research on HIV with the Medical Research Council of South Africa and embedding public health in the curriculum of a new medical school in Ireland.



Professor Mary Benwell

Independent Trustee: Gas Safety Trust. Former Professor and Director of the Business School, Oxford Brookes University

Mary is a behavioural scientist and has a PhD in transport economics. She is a Professor of both Cranfield and Oxford Brooks Universities.

Now retired, she spent much of her life in higher education, as a teacher, a researcher and a director of a business school. She has also worked as a director of a transport consultancy, advising central and local governments in the UK and France on transport policy impacts. Mary served as a non-executive director on the boards of the Oxford Radcliffe Hospitals Trust and on the Central Police Training and Development Authority. Until recently, she chaired the Gas Safety Trust's Research Funding Group.



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Date: March 2017.